

(mean RRT: 3.5 ± 0.6 vs 5.2 ± 0.6 1/ms; mean lapses: 3.5 ± 0.1 vs 4.3 ± 0.1). No differences were found between the snack and no eating conditions.

Conclusion: These results indicate an effect of ‘meal inertia’, whereby attention is impaired immediately after eating a meal, but not a snack, and this impairment lasts throughout the night. Reducing the size of the meal eaten during the shift may reduce performance impairments, and this has implications for those who eat at night and then immediately return to work.

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USE OF HUMAN PERFORMANCE RESPONSE CURVES TO DEMONSTRATE CIRCADIAN ADVANTAGES FOR TEAMS PLAYING NIGHT GAMES ACROSS A NATIONAL FOOTBALL LEAGUE SEASON

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Introduction: It is well established that west coast (WC) teams of the National Football League (NFL) win more night games, dating back to the 1970s. Recent data (Brager and Mistovich, 2017) show that this night game advantage for WC teams is due to fewer regular season injuries to linemen. Here, we extend upon these historical datasets to determine additional factors producing a circadian advantage in performance due to season schedules.

Methods: We generated human performance response curves (hPRCs) based on biological time for points scored, yards gained, and the number of turnovers for each of the 32 NFL teams during the 2013 regular season ($n=257$). The hPRCs compared changes in the performance metrics relative to biological time (normalized to Eastern Time).

Results: Game time did not change the extent of points scored and yards gained for winning ($p=0.30$ and 0.45 , Krusal-Wallis) or losing teams ($p=0.46$ and 0.87 , Krusal-Wallis). As expected, winning teams scored more points (11.3 ± 0.1 spread) and gained more yards (40.7 yd ± 0.2 spread) than losing teams (all, $p<0.01$). In Brager and Mistovich, 2017, we reported that losing teams had one more turnover than winning teams (2.1 vs. 1.1). Here, we found that the extent of fewer turnovers for winning teams is additionally circadian-dependent ($p=0.003$, Krusal-Wallis). Winning teams had fewer turnovers during late evening games (2000, 2100 EST) - upswing of circadian-regulated alertness — compared to afternoon games (1300, 1600) - down swing of circadian-regulated alertness.

Conclusion: These analyses lend further credence to the observation that the circadian timing system exerts significant influence on performance metrics of professional sporting teams independent of talent, geography, and home field advantage. Thus, appropriate countermeasures may need to be implemented to counteract circadian-regulated influences on game day statistics.

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0173

THE EFFECT OF SLEEP ON MOOD OF U.S. NAVY SAILORS

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Introduction: U.S. Navy crewmembers experience sleep deprivation and circadian misalignment due to long workdays. They frequently work rotating schedules that impose >6 hr of jetlag daily, resulting in disrupted circadian rhythms. This study assessed sleep and mood of crewmembers on a Navy ship.

Methods: Volunteer crewmembers ($N=868$) from 7 ships participated in studies of mood, work and rest patterns. Sleep was assessed for ~ 12 days with actigraphy and daily activity logs. Mood was assessed using the Profile of Mood States (POMS).

Results: Crewmembers slept $\sim 6.59 \pm 1.0$ hrs/day; 27.1% sleep ≤ 6 hours/day. Approximately 69% of the crewmembers had POMS Total Mood Disturbance (TMD) scores $\geq 50^{\text{th}}$ percentile adult norms. Specifically, four of six POMS Subscales exhibit degraded mood (Vigor: 83.3%; Confusion/Bewilderment: 63.4%; Anger/Hostility: 62.7%; Fatigue: 59.7%). Compared to officers, enlisted personnel were 4.52 (95% CI 1.13 - 18.1) times more likely to have elevated ($\geq 75^{\text{th}}$ percentile) Anger/Hostility scores and lower Vigor scores (RR=2.84, 95% CI 1.20 - 6.73). Approximately 10% of enlisted crewmembers had depression scores $\geq 75^{\text{th}}$ percentile; no officers fell into this category. Crewmembers working non-circadian shifts were 1.77 (95% CI 1.10 - 2.85) times more likely to have elevated anger scores ($\geq 75^{\text{th}}$ percentile). Multiple regression showed that daily sleep duration, number of sleep episodes per day, gender, rank, and watchbill type were significant predictors of TMD scores. Enlisted, females, and crewmembers with split-sleep had worse TMD scores. Compared to crewmembers on fixed watchbills, those using non-circadian watchbills were 1.17 times (95% CI 1.04 - 1.32) more likely to have higher ($\geq 50^{\text{th}}$ percentile) TMD, Anger/Hostility (RR=1.30, 95% CI 1.13 - 1.50), and Fatigue scores (RR=1.36, 95% CI 1.18 - 1.57). Notably, sleep duration was associated with improved TMD scores of crewmembers on fixed watchbills, but worse TMD scores for individuals on non-circadian, rotating watchbills.

Conclusion: Crewmembers report poor mood according to POMS Total Mood Disturbance, Vigor, Confusion/Bewilderment, and Anger/Hostility subscales. Enlisted crewmembers had worse mood compared to officers, female (as compared to male) crewmembers also reported worse mood. Of note, females were under-represented in the senior rank structure.

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U.S. POLICE DEPARTMENT ROSTERS: PUBLIC COMPLAINTS AND ON-DUTY ACCIDENTS

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Introduction: Police officers respond to emergencies, patrol neighborhoods, and handle citizen complaints around-the-clock, and their sleep opportunities are frequently reduced by extended duty hours and secondary employment. Twenty-five percent of U.S. protective services (including police) also work shifts. Shift work and sleep loss increase fatigue, sleepiness, and accident risk, and are associated with changes in mood. These stressors have economic and community consequences. We examined associations between unscheduled work hours, fatigue and sleepiness, and public complaints and on-duty accidents.

Methods: Officers at four police departments reported work hours, and reported public complaints (2 departments) and on-duty accidents from 2–29 weeks. Peak FAID/KSS scores (i.e. max scores while on shift) were predicted using FAID Quantum, and were tested as predictors of complaints and accidents. Odds ratios determined fatigue/sleepiness benchmarks that were predictive of complaints and on-duty accidents (2-levels: benchmark met/not met; FAID range tested: 60–100; KSS range tested: 1–9).

Results: 379 officers and 32,712 work shifts were studied. Nightshifts and court appearances were more prevalent prior to days with